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ABSTRACT

Testimony presented at a congressional hearing on illiteracy (March 1986) indicated that good readers use their myelinated corpus callosum fibers (which connect the left and right hemispheres of the brain) at millisecond speeds to coordinate the two brain hemispheres. Students taught using the whole-word recognition method (also called the look-say method and the whole language approach) from the start up to age 9 demonstrate effects resembling those caused by the surgical commissurotomy of the corpus callosum. Some researchers feel that there are several external effects that can be used with remedial readers to make up for the corpus callosum which has gone out of the business of decoding print, including: (1) oral reading; (2) using a fescue-pointer; (3) round robin oral reading; (4) sharing a book using a fescue to guide the reader's attention; and (5) confirming correct readings with immediate praise. These researchers also feel that the whole language approach, which puts primary stress on gathering meaning has, in the end, destroyed it. (RS)

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Commissurotomy of the Corpus Callosum and the Remedial Reader

PART ONE: How the Corpus Callosum Works:

Charles Micciche [MAR.20, 1986, p.17-18] explained to a Congressional Subcommittee:

"The normal brain [Wernicke and Broca studies] separates the two critical language functions of surface recognition and deep meaning in its halves. The left brain is the computer, the clerk, the humorless functionary which spends its time before a limitless array of pigeonholes, sorting, cataloging, and retrieving the elemental units of language, words. The right brain is the artist and poet, the emotional, directionless purveyor of images, concepts, flashes of insight, the master of pun and metaphor.

"Split-brain studies illustrate the divided nature of the halves, their limits and potential, and through study of certain unfortunate disease conditions, reveal the mechanism and importance of linkage. This fibrous body of nerve tissues, the corpus callosum, articulates right and left brains, and allows the balance of communication essential to normal language development. Restak describes the development of this tissue as it matures to its final function: the formation begins in the early months of life and may not be completed until age nine or ten. During this time, pruning of unnecessary neurons takes place along with myelinization of the fiber tracts. Early in life, neural connections are almost random. As a child experiences his environment, pathways develop to facililtate more efficient transmission signals."

> During his babbling stage a baby makes all the sounds of all the world's languages. Then he selects those sounds which are being used by the speakers around him, and he attaches meanings to sounds by observing connections to things *outside* his body--objects, motions, feedbacks. Thereafter he drops those phonemes which his cradle language does not use. In later life he will find it difficult to speak any other language without an accent. As we shall see, there is a parallel here with what happens in the corpus callosum.

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Micciche continues: "At this point [early in life], left and right brains are working independently, yet beginning to settle into their assigned roles, as connections in the corpus callosum mature.. The cataloguing left brain stores and recalls the phonic essence of the words, the imaging right brain acribes meaning. ..... This is an extremely vital nexus in the child's life, because he will be able to learn either to recognize words or to decipher them depending upon which half of his brain is engaged in learning to read. Remember, the corpus callosum is not yet fully formed, and either hemisphere is accessible with relatively equal facility. An approach to the right brain with holistic concepts, with picture associations, colors, shapes, with whole word units, if used throughout the complete development phases of the corpus callosum, will set a life-long learning pattern. The child will be brain-conditioned to learn all the printed words of his language, one by one, as wholes.

"Should the child be introduced to reading by the decoding and encoding mechanism of the alphabet and its combinations of letters, he is then being brain-conditioned to attack words through the logic and organization of syllabic and spelling structure. ...Once the facts become fixed, similar to the fixation of sound production in the infantile babble phase, the essential skills of reading words is embedded. ...

"However, the child taught holistically about words and never given the key to their decoding, the child taught look-say or whole-word reading, is condemned to a future of using mental gymnastics, mnemonic devices, and Gestal miracles to learn to read words one by one."

> Here is a sample, tape- recorded from the reading of an 11-year-old who was taught to read by the whole-word method:
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> "Claudia leaning the door was left of the bus seat. ...Claudia saw that her pockets were so heavy that they were pulling his pants down. There was a gas of an inch. ... My compress, I got it for my birthday last year. Anything uses a compass for that. ... The train was not filled with computers so Claudia walked up to the usher."

The "whole-word" method which put early emphasis on "gathering meaning" has, in the end, destroyed it!

Colwyn Trevarthen in [OCM p.108-109] explains that the corpus callosum, enormous at birth, gets reduced and organized by how it is used: "After birth, brain development depends on how patterns of stimulation from the outside world meet the varying inner states of brain activity. ... In the mature brain, detailed information about perceptions, memories, and fine motor co-ordinations can only pass over the interhemispheric space by a massive bridge of fibers called the corpus callosum. This structure develops in fetal stages, increasing in size from its first appearance at ten weeks of gestation until it has over a billion fibres at birth. In the next three months, there is a decrease in size as a large proportion of this huge population of callosal axons is eliminated. This weeding out confines contacts between the hemispheres to certain cortical zones, separating groups of cells that send axons over the corpus callosum from other groups that send axons forward and backward, inside one hemisphere. ... This orderly anatomy clears in infancy when redundant axons are eliminated and synaptic fields are sorted out, a process which forms the basis for sharp perceptions and precisely skilled movements. From four months after birth the interhemispheric bridge gains in bulk as its fibres receive a sheath of myelin. Interhemispheric commununication matures in step with the development of mature synaptic arrays in different cortical areas over the first decade or so of childhood."

Peter W. Nathan [OCM, p.53 and p. 517] explains the effects of that myelin sheath: "Reading is associating the visual representation of the word with its auditory representation. ... All of it happens in milliseconds once it has been practised." ... "The conduction of the nerve impulse in myelinated fibres is different from that in non-myelinated fibres. Conduction in myelinated fibres is called *saltatory conduction*, as the current jumps from node to node. ...The rate at which the impulses are conducted is between 0.5 and 2 metres per second in the case of non-myelinated fibres and from 2 to 120 metres per second in the case of myelinated fibres."

> Thus the good reader is using those myelinated corpus callosum fibers at millisecond speeds to co-ordinate the two hemispheres of his brain. Meanwhile our remedial reader is struggling with only half her brain to remember whole words and to guess at meanings.

PART TWO: When the Corpus Callosum Doesn't Work:

> Hildred Rawson, [Walcutt, pp.129-130] a tutor of long experience, reports that:
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> "Children under ten years, of normal intelligence, can always be taught to read at their mental age. Children from ten to twelve can usually be rehabilitated, continuing through school and doing reasonably well. For older children, satisfactory recovery depends on the number of years of reading retardation, and the damage to the personality this has caused. ... But any child deprived of this skill [reading] in our society is deprived also of mental health."

What happened? One answer appears to reside in the *corpus callosum*, the mass of fibers which connects the left-brain hemisphere (master of language) with the right-brain hemisphere (oriented for picturesand meaning, holistic, the Gestalt approach): Surgical commissurotomy of the *corpus callosum* for the relief of debilitating epilepsy has made it possible to observe in these cases some of the functions of the *corpus callosum* and how, in its normal state, it links the brain hemispheres. Colwyn Trevarthen [OCM p.740-746 passim] decribes how the epileptic, with his corpus callosum cut, can function satisfactoriy by using the outside world for feedback: "When interhemispheric connections are cut, communications between the two sides must pass though external relations of the body with the world of stimuli and the effects of action."

As he did in his babbling stage, the epileptic patient checks what he hears with what he sees in the outside world. As a substitute for his cut corpus callosum, the patient uses outside tools, his hands, for example, to explore and confirm messages. Since he has two hands, two eyes, two ears, the patient can receive these external messages in both brain hemispheres. Even with the loss of some levels of consciousness by the commissurotomy, he can still function almost normally.

Question: When the child has been taught by the whole-word-recognition method (also called look-say or "whole language") from the start up to age 9, are there effects which, in part, resemble the commissurotomy of the *corpus callosum*?

The whole-word-recognition method uses the Gestalt approach which is the mode of the right-brain, and teaches recognition of each word - whole- as if it were a picture. In his chart [OCM p.742] Trevarthen shows that "speech (both articulating and hearing speech) and superior comprehension of language" are left-brain functions. Yet the left-brain, under look-say instruction, has not been participating in the initial learning. By age 9 some of the unused *corpus callosum* crossover fibers have been eliminated, just as in the babbling stage some sounds were dropped,-- from disuse. Is it too late for such a child to learn how to read?

What can we suggest as ways in which to help our 11-year-old remedial reader? Can we use some external effects to make up for her corpus callosum which has now gone out of the business of decoding print? Such as:

1. Oral reading as a contact with the world outside the body --- instead of silent inward reading?

2. Using the fescue-pointer as contact outside the body --- instead of sitting on her hands?

3. Round-robin oral reading for the whole class, (or reading with a tutor) --- instead of "Individualized Reading" to a classroom teacher (who, meanwhile, was grading papers)?

4. Letting the child read to a tape-recorder to hear for herself exactly what kind of mistakes she was making --- instead of testing her on what she had attempted in garbled silent reading?

5. Sharing a book with her, lap-reading style, reading aloud and tracking the text with fescue to guide her attention --- instead of talking about about material she has only half understood.

6. The Yes-Method wherein the tutor immediately confirms the learner's correct readings: "yes, that's right, good!" ---instead of check marks in a workbook and grade-level labels.

PART THREE: Let's Make It Work the First Time!

When the next child shows up, let's begin reading instruction with phonics for with the left-brain. Let's begin when a child first shows interest, often at age 4½ or 5, when the *corpus callosum* is flexible -- - instead of delaying reading on the grounds of "readiness". The child at age 5 does not concern himself with "gathering meaning". What fascinates him is the decoding process! Once he learns the ABC code, he often invents with his friends an additional secret code, just for fun. Meaning comes readily enough to such a beginner as he decodes the words aloud and hears them match his already familiar spoken language.

Anyone who sits down to hear an 11-year-old remedial case trying to read aloud, as in our sample above, rapidly observes that "reading for meaning" has become confusion. Through some five school years she has been taught to look for meaning while not knowing what the words ***are***, so that now she has accepted that reading consists of vague and peculiar distortions. I wonder what she makes of it when she sees the rest of us *enjoying* reading? It attacks sanity!

For her, the code was not mastered before age 9, when the *corpus callosum* was fully open to use the left hemisphere where her language power was already stored. For her, reading instruction began as a noble call for gathering meaning. She was taught to use the right-hemisphere for meaning,-- without first using the left hemisphere to decode the actual words! For our 11-year old, reading has become a mish-mash of guesses. What is "read" by such a child doesn't make sense. Her misreadings have become a blur of unintelligeable nonsense, a threat to the child's mental health.

> **The "whole-language" program, which put primary stress on "gathering meaning" has, in the end, destroyed it!**

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MAR.20, 1986 Oversight on Illiteracy in the United States, U.S.House of Representatve Subcommittee Hearing, March 20, 1986. Serial No. 99-91. Out-of-print, available at all State ibraries.
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